

## APPENDIX II.

### Instructions for Vegetation Measurements at WHWO survey stations and Nest Sites *Modified from - BIRDS AND BURNS NETWORK PROJECT*

#### PLOT ESTABLISHMENT

A vegetation plot is established at each WHWO calling station and nest site. The center of the plot is the survey point along the transect used for the playback surveys, or nest tree/snag. The plot is divided into 4 segments, each of 50-m lengths and associated variable-width rectangular plots. The plots are established by orienting line transects (segments) in 4 directions from the survey point (Figure 1). Two segments are parallel to the WHWO survey transect, and 2 segments are perpendicular to the WHWO survey transect. Segment 1 will be established using the same azimuth as the WHWO survey transect; segment 2 will be established 90 degrees in a clockwise direction; segment 3 another 90 degrees in a clockwise direction, segment 4 another 90 degrees in a clockwise direction. For nest sites, establish segments in the 4 cardinal directions, with N being segment 1.

Each 50-m segment and associated plots are numbered (1 through 4) as shown in Figure 1. Parallel segments meet at the point count center. Perpendicular segments begin 10 m from either side of survey point center and form a “plus sign” (Figure 1). Note that Segment numbers for all vegetation measurements will be the same.

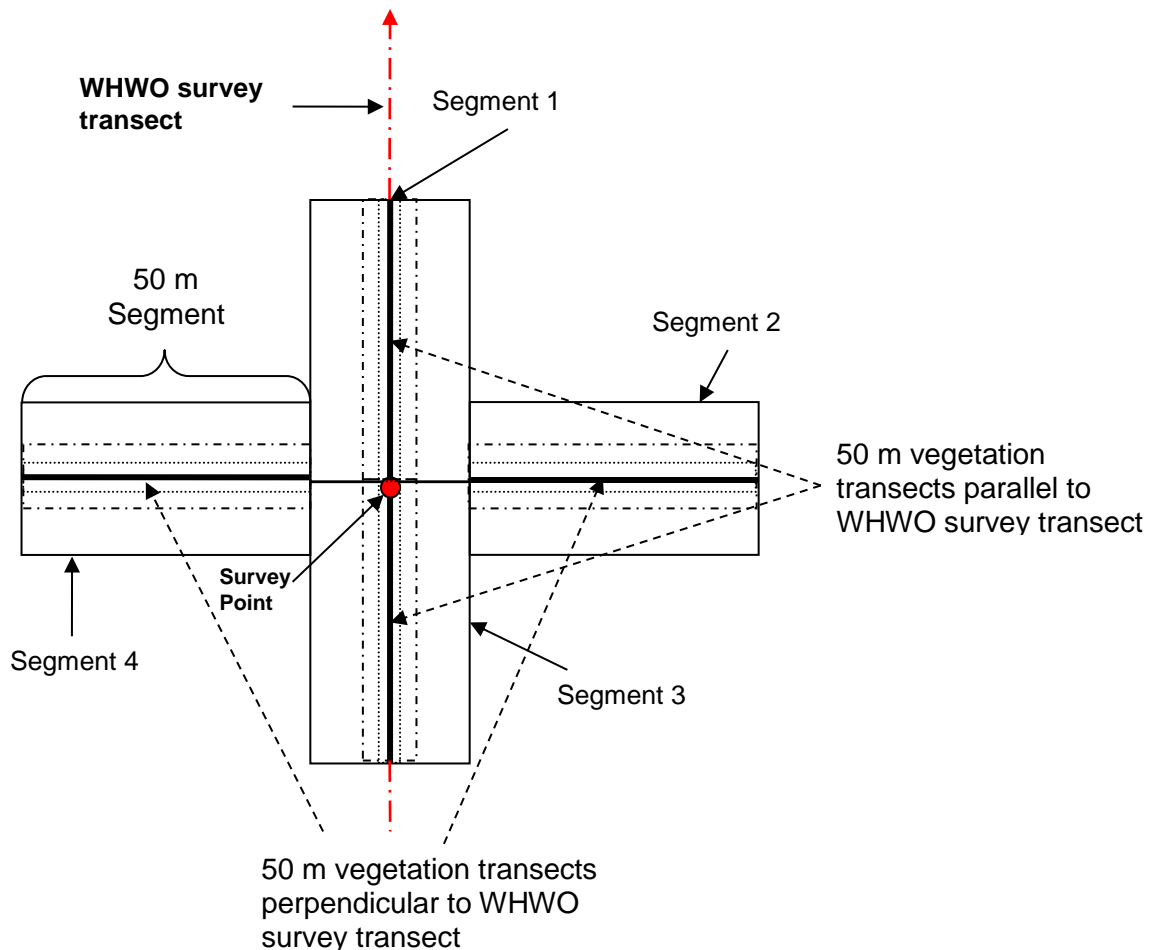


Figure 1. Sample design surrounding WHWO Survey Points.

## **RE-MEASUREMENT OF PLOTS**

When re-measuring plots for the second measurement, only snags and trees > 10 cm dbh need to be re-measured. However, if there has been disturbance, natural (e.g., fire, bug kill) or harvest related, the entire suite of measurements will need to be re-measured.

## **DATA FORM - LIVE TREES**

**TREES:** If a tree has any green needles or leaves retained on it, regardless if it is upright or fallen over, treat it as a tree. If the central axis of a tree is < 3 m (< 1 m for small trees) from the center transect line, it should be measured. Use the CENTRAL AXIS at breast height (1.4 m tall) of each tree to determine whether a tree qualifies to be counted within the plot. Measure the DBH of the tree on the uphill side in steep terrain. If using a Biltmore stick and the tree has irregular growth (i.e. one side is flattened), take the mean of the DBH measured from two sides. For trees whose distances are marginal (can't visually tell how far away they are), use a tape to measure the PERPENDICULAR distance (with tape level at breast height [1.4 m] above the ground) from the transect line to the side of the tree where the central axis of the tree is located. Some trees may occur at exactly 3m from transect – to avoid issues associated with the “edge effect” of plot sampling, you should measure the first tree that occurs at exactly 3m from the center transect line and then measure every other tree that falls exactly on the edge (3m from transect).

**DATE:** ddMMMy (example: 15APR11).

**PLOT TYPE (circle one):** Circle type of plot – survey point or nest location

**TRANSECT\_ID:** Unique 5 character transect number assigned by the Regional Office (e.g. TR603). **For survey points only.**

**POINT\_ID:** Unique numeric identifier assigned to each survey station (i.e., 1-10) or nest site. This will be the survey point number for vegetation plots associated with transects.

OR

**NEST\_ID:** Assign a unique identification number to the cavity beginning first with an “N” to indicate a nest and to avoid confusion with transect ids in the database. For example, the first WHWO nest found near point count station 5 on transect TR603 would be recorded as “NTR6030501” for nest, transect “TR603”, nearest point count station “05”, first nest associated with this station “01”. If a second nest is located and is also associated with point count station “05”, it would be coded “NTR6030502”.

**RECORDER(S):** Initials of person(s) collecting data, 3-letter code (e.g., **VAS**=Vicki A. Saab). Place initials in alphabetical order when working with another person (e.g., **JLD, VAS**). Print full names in the comments section of the first datasheet.

**REVIEWER(S):** Initials of person(s) reviewing data sheet for legibility and completeness. This should be left blank by the field crew.

**COMMENTS:** Record any additional comment

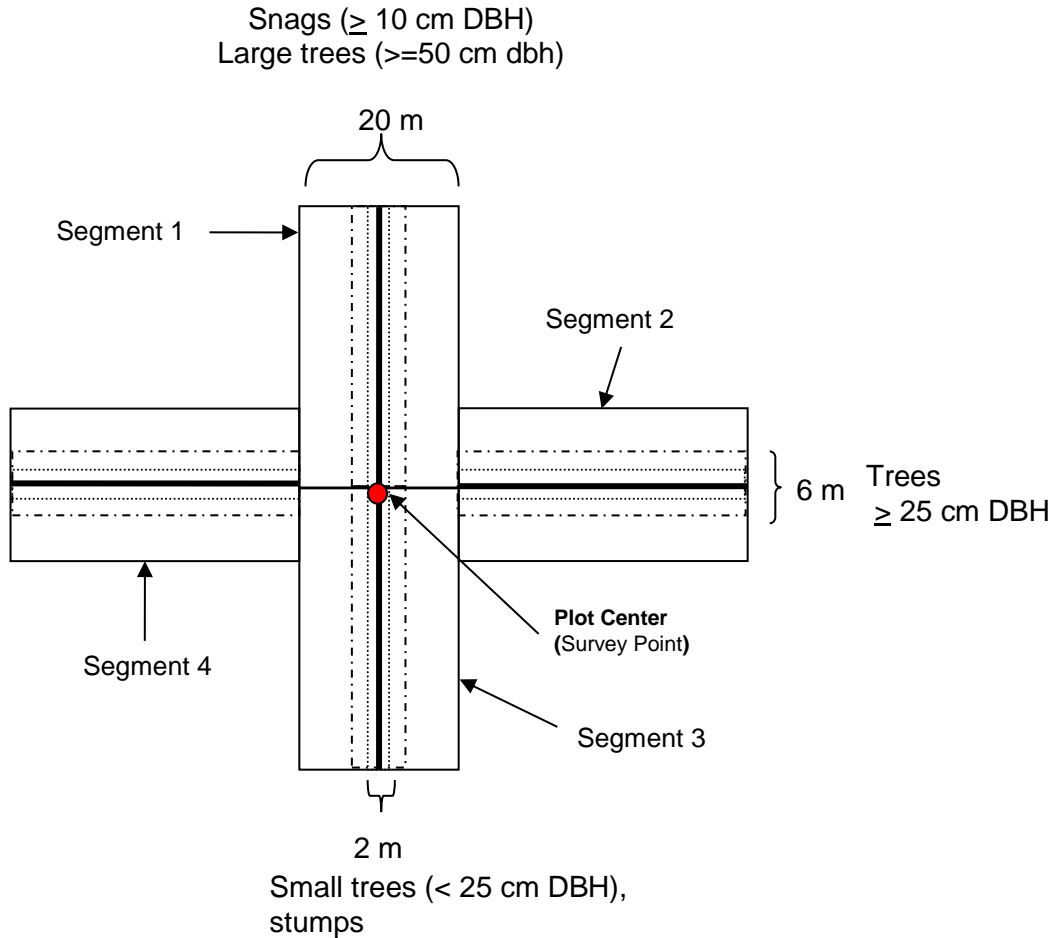


Figure 2. Variable-width rectangular plots at WHWO survey points

**FOR ALL DATA TABLES:**

**AZIMUTH:** Compass bearing of the center transect of the rectangular plot – transect 1 will be same azimuth as WHWO survey transect or North (0) for nest sites, transect 2 will be 90 degrees in a clockwise direction, transect 3 another 90 degrees in a clockwise direction, transect 4 another 90 degrees in a clockwise direction.

**SEGMENT:** Unique whole number to describe 50-m rectangular plot segment within the sampling area - segments 1, 2, 3, or 4 (Figure 2). Parallel transects meet at the point count center. Perpendicular transects meet 10 m from either side of survey point center and form a “plus sign”.

**Live Trees  $\geq 10$  to < 25 cm dbh: Four 50 x 2 m segments about the plot center**

**TALLY:** Tally all trees  $>10$  cm and  $< 25$  cm dbh, **by species**, within 1 m of center transect in each segment Enter “9999” if there are none.

**Live Trees  $\geq 25$  cm dbh: Four 50 x 6 m segments about the plot center and**

**Live Trees  $\geq$  50 cm dbh: Four 50 x 20 m segments about the plot center**

For all trees  $\geq$  25 cm dbh and within 3 m of the center transect line, and all trees  $\geq$  50 cm dbh within 10 m of the center transect line, enter azimuth and segment as per above for each tree and record the following information:

**Species:** Enter the corresponding four- or five-letter code of the tree species. See tree list above. If no trees are encountered in the plot segment enter "9999".

**CLASS:** Enter the numeric value for the appropriate structural class of the tree.

**1** = Sound

**2** = Some decay evidence (Dead top, broken top/branch, fungi, fire scars, insect evidence, woodpecker foraging)

**3** = Broomed-trees

**4** = Hollow

**DBH:** Measure the diameter at breast height (1.4 m) of the tree using calipers, a Biltmore stick, or diameter tape. Record to the nearest cm and round up if necessary. If the dbh is borderline using calipers or Biltmore stick, measure with a diameter tape.

**HT (Height):** Enter the height of the tree using a clinometer or laser hypsometer, to the nearest m.

**CBH (Crown base height):** Enter the height to the base of the tree crown. Measure LIVE crown base height (the height of the lowest live branch whorl with live branches in two quadrants exclusive of epicormic branching (brooms) and of whorls not continuous with the main crown) using a clinometer or hypsometer. Record to the nearest m.

**PCD (Percent of crown dead):** Enter the visual estimation of the percent of tree crown that is dead to nearest 5 percent.

**CENTER TREE?:** Enter the appropriate letter to indicate whether the tree under examination was the central tree of the survey station or a nest tree. Center trees should be included only in segment 1.

**Y** = Yes

**N** = No

## **DATA FORM – SNAGS/STUMPS**

**HEADER INFORMATION:** Enter as per instructions for Trees data sheet. UTM data for plot location does not need to be re-entered.

**COMMENTS:** Record and additional comments.

**AZIMUTH (AZ):** Compass bearing of the transect being surveyed – transect 1 will be same azimuth as WHWO survey transect or North (0) for nest sites, transect 2 will be 90 degrees in a clockwise direction, transect 3 another 90 degrees in a clockwise direction, transect 4 another 90 degrees in a clockwise direction.

**SEGMENT:** Unique whole number to describe 50-m rectangular plot segment within the sampling area - segments 1, 2, 3, or 4 (Figure 2). Parallel transects meet at the point count center. Perpendicular transects meet 10 m from either side of survey point center and form a “plus sign”.

**For all stumps <1.4 m and ≥25 cm top diameter: within 1 m of the center transect line, record the following:**

**Natural\_stumps:** Tally the number of natural stumps (n) within 1 m of the center line. For the purposes of this study a natural stump is defined as any stump < 1.4 m in height and ≥ 25 cm at the **TOP of its bole** created by breakage due to natural conditions (i.e. wind, rot). Stumps are considered “in” if the center axis is within 1 m of the segment line. Enter “9999” if there are none.

**Human-cut\_stumps:** Tally the number of cut stumps (n) within 1 m of the center line. For the purposes of this study a cut stump is defined as any stump < 1.4 m in height and ≥ 25 cm at the **TOP of its bole** that was created by a chainsaw or other mechanical means. Stumps are considered “in” if the center axis is within 1 m of the segment line. Enter “9999” if there are none.

## **DATA FORM – SNAGS >10 cm dbh**

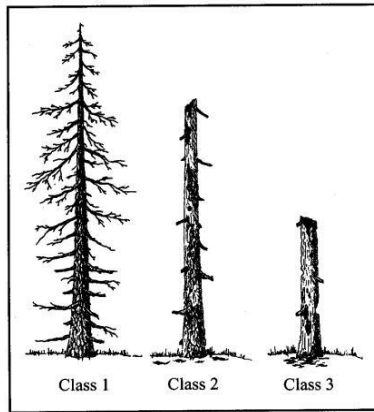
**Snags ≥ 10 cm dbh: Four 50 x 20 m segments about the plot center**

**SNAGS:** For the purposes of this study a snag is defined as a standing dead tree. If any green needles or leaves persist anywhere along the bole, treat it as a live tree instead of as a snag. Snags are ≥ 10 cm DBH and ≥ 1.4 m in height. For leaning dead trees, if the smallest angle between the dead tree and the ground is > 45 degrees it is a snag; otherwise it is a log. Measure the DBH of the snag on the uphill side of the snag in steep terrain. If using a Biltmore stick and the snag has irregular growth (i.e. one side is flattened), take the mean of the DBH measured from two sides. If the **CENTRAL AXIS** at breast height of a snag is < 10 m from the center transect line, it should be measured. For snags whose distances are marginal (can’t visually tell how far away they are), use a tape to measure the **PERPENDICULAR** distance from the transect line to the side of the snag where the central axis is located. Some snags may occur at exactly 10 m from transect – to avoid issues associated with the “edge effect” of plot sampling, you should measure the first snag that occurs at exactly 10 m from the center transect line and then measure every other snag that falls exactly on the edge (10 m from transect).

**For all snags ≥10 and <25 cm dbh and within 10 m of the center transect line, record the following. Remember to look up! Snags directly on the transect line are those most often missed.**

**Species:** Enter the corresponding four- or five-letter code of the snag species. **Do not guess at species;** use unknown species codes (e.g., UNKN1, UNKN2 for first and second unknown species) when species is in question. See tree species table above. If no snags are encountered in the plot segment enter “9999”.

**DECAY CLASS:** Enter the numeric value for the appropriate decay class of the snag (Bull et al. 1997):



- 1 = Snags that have recently died, typically have little decay, and retain their bark, branches, and top.  
2 = Snags that show some evidence of decay and have lost some bark and branches, and often a portion of the top.  
3 = Snags that have extensive decay, are missing the bark and most of the branches, and have a broken top.  
4 = Burnt snag; almost entire outer shell is case-hardened by fire; looks like charcoal (not shown above).

**DBH:** Measure the diameter at breast height (1.4 m) of the snag using calipers, a Biltmore stick, or diameter tape to the nearest cm. Record to the nearest cm and round up if necessary. If the dbh is borderline using calipers or Biltmore stick, measure with a diameter tape.

**HT (Height):** Enter the height of the snag using a clinometer or laser hypsometer, to the nearest m.

**FIRE SCAR? (Y/N);** Does the snag have a fire scar (catface)? Do not include lightning scars that spiral down the tree or other lightning scars that do not occur near the ground.

**CENTER SNAG?:** Enter the appropriate letter to indicate whether the snag under examination was the central snag of a survey station or a nest snag. Center snag is included only in plot segment 1 if a snag is used as plot center.

Y = Yes

N = No

## **DATA FORM – LARGE DOWN WOOD**

**DOWN WOOD:** For the purposes of this study, DOWN LOGS are any down wood pieces or logs whose central axes (the center of the bole or the pith) are INTERSECTED by the transect line (Figure 4). Logs  $\geq 10$  cm large end diameter (LED) and 1 m in length are measured along each 50-m segment in the four directions (parallel and perpendicular to WHWO survey transect). For logs broken into two pieces, treat it as one log if the pieces are touching. To qualify as a DOWN LOG the axis of the log or stem must lie above the ground (above duff and mineral soil layer). Dead stems attached to a live tree are not counted. Multiple branches attached to dead trees or shrubs are each tallied separately. For leaning dead trees, if the angle between the dead tree and the ground is  $< 45$  degrees it is a down log; if greater, it is a snag. If the central axis of a suspended log is  $< 1.8$  m above the ground where the transect passes, tally the log on the transect; otherwise, disregard it.

**HEADER INFORMATION:** Enter as per instructions for Trees data sheet. UTM data for plot location does not need to be re-entered.

**AZIMUTH:** Compass bearing of the transect being surveyed – transect 1 will be same azimuth as WHWO survey transect or North (0) for nest sites, transect 2 will be 90 degrees in a clockwise direction, transect 3 another 90 degrees in a clockwise direction, transect 4 another 90 degrees in a clockwise direction.

**SEGMENT:** Unique whole number used to describe 50-m transect within the sampling area - segments 1, 2, 3, or 4 (Figure 3). Parallel transects meet at the point count center. Perpendicular transects meet 10 m from either side of survey point center and form a “plus sign”.

**Down Wood  $\geq 10$  cm LED and  $\geq 1$  m long: Four 50 m transects about the plot center**  
**For all down logs that intersect the center transect line and are  $\geq 10$  cm LED and  $\geq 1$  m long, record the following:**

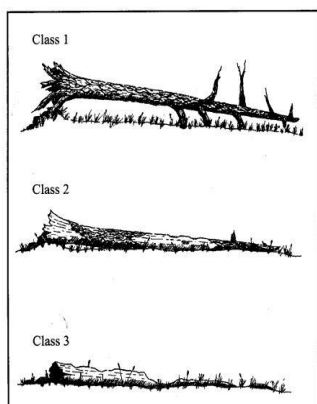
**SPECIES:** Enter the corresponding four- or five-letter code of the log species. If no logs are encountered along the segment (50 m), enter the code “9999”.

**INTERSECT:** For all logs whose LED is  $\geq 10$  cm, record the intersect diameter to the nearest cm.

**LED:** Measure the large-end diameter to the nearest cm of the log. See Figure 4 to determine where the LED is on logs with different characteristics.

**LENGTH:** Only for those logs with LED  $\geq 10$  cm and  $\geq 1$  m long, enter the total length of the log

**DECAY CLASS:** Enter the numeric value for the appropriate decay class of the log (Bull et al. 1997):



- 1** = Logs that have recently died, typically have little decay, and retain their bark, branches, and top.
- 2** = Logs that show some evidence of decay and have lost some bark and branches, and often a portion of the top.
- 3** = Logs that have extensive decay, are missing the bark and most of the branches, and have a broken top.
- 4** = Burnt log; almost entire outer shell is case-hardened by fire; looks like charcoal (not shown above).

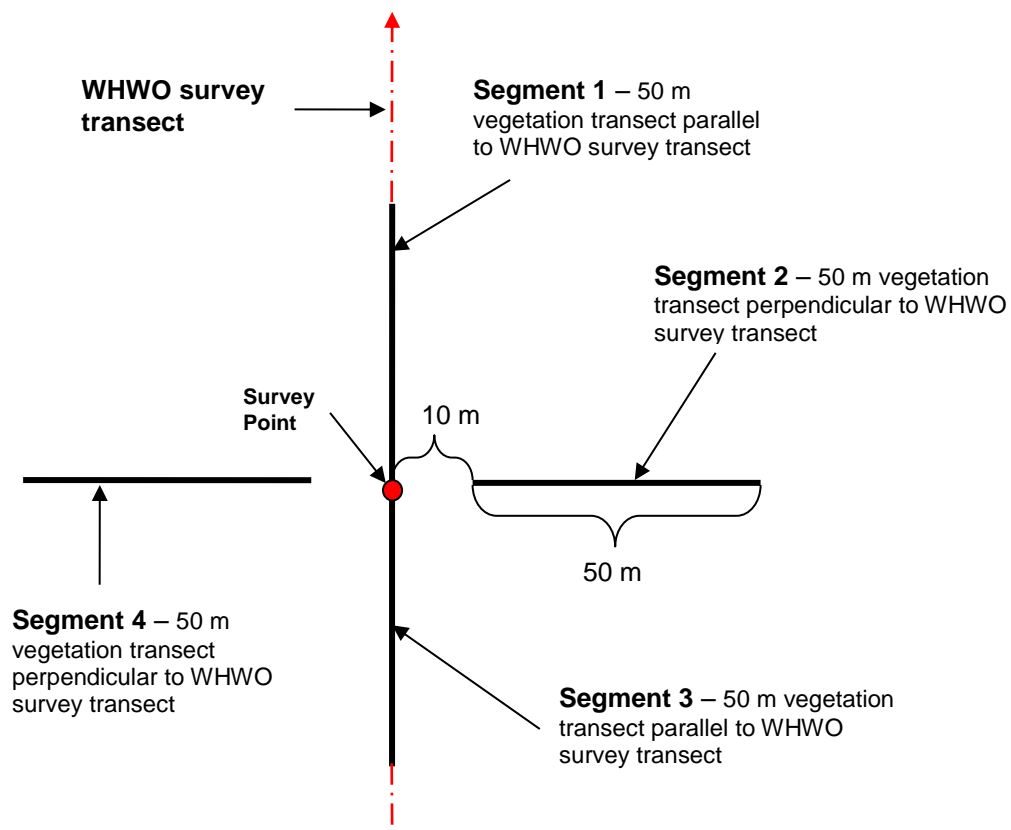


Figure 3. Line transects surrounding WHWO Survey Points. Used for large down wood.

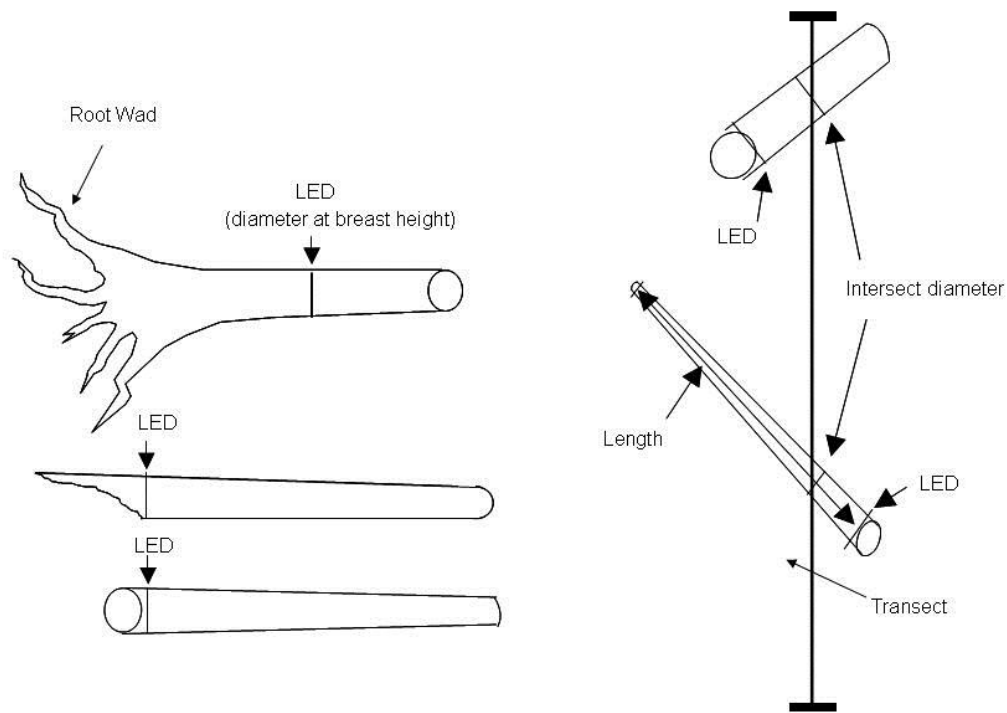


Figure 4. Sampling illustrations for large down wood.

## **DATA FORM – PHOTOLoad PLOTS - 1 to 100-Hour Fuels, Herbs, Shrubs, Litter/Duff**

**HEADER INFORMATION:** Enter as per instructions for Trees data sheet. UTM data for plot location does not need to be re-entered.

### **ESTABLISH “PINWHEEL” PHOTOLoad PLOT LOCATIONS**

At each distant end of the 50-m segments 1 and 3 (along the survey transect), establish the photoload plots (see Figure 5). At each of the 2 locations, 4 photoload plots should be arranged in a clockwise pinwheel configuration with far plot corners 5 meters from plot center (see Figures 6 - 7). Make sure the first photoload plot is established to the right (clockwise) direction of the 5 meter line (see Figures 6 and 7). The plot is 1 x 1 m square, and a sampling frame made of PVC pipe must be assembled before the data are collected and datasheets are filled out. The sampling frame is moved to each pinwheel plot location as sampling progresses. Plots are identified and numbered by both their location and position on the pinwheel. Plots at the forward-most location along the survey transect at the end of segment 1 are identified as F (Forward; Segment 1), and plots at the rearmost location along the survey transect at the end of segment 3 are identified as R (Rear; Segment 3). Within each location, plots are numbered from 1 to 4, beginning with the plot most forward along the survey transect. For example, the 1<sup>st</sup> “pinwheel” plot sampled at the rear-most location (segment 3) would be identified as: **R-1**.

**Indicate Segment on data sheet header:**

**Segment (circle one):** SEGEMENT 1 (Forward) / SEGMENT 2 (Rear)

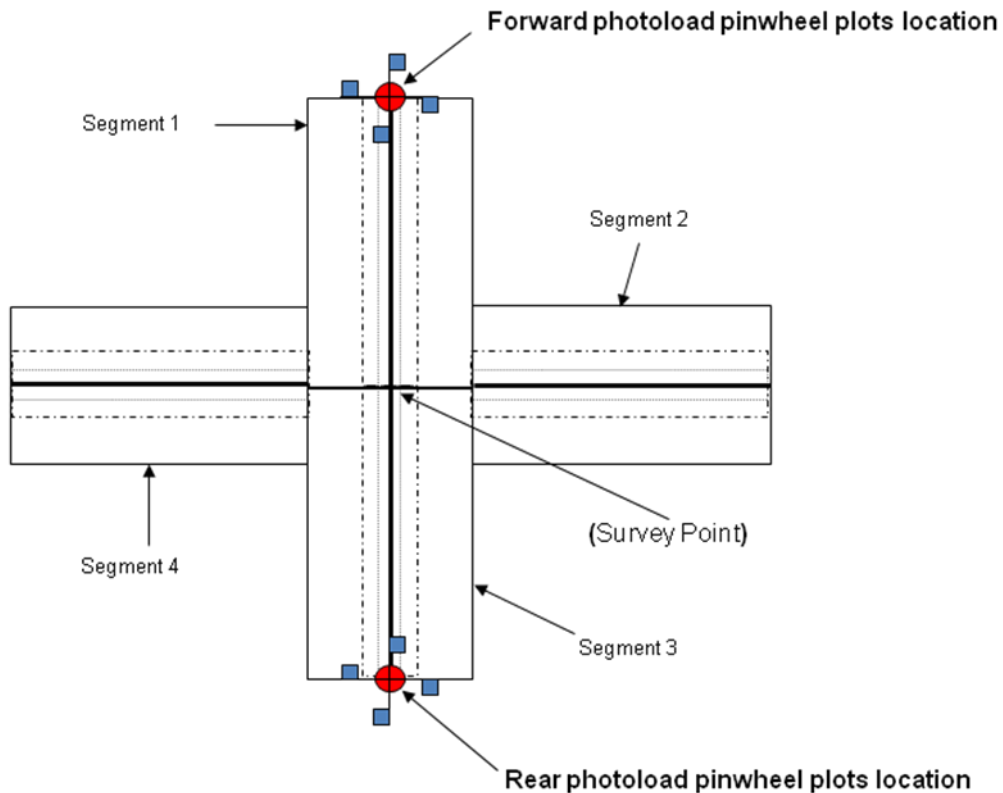


Figure 5. Location of pinwheel photoload plots at forward and rearward ends of segments 1 and 3 along transect.

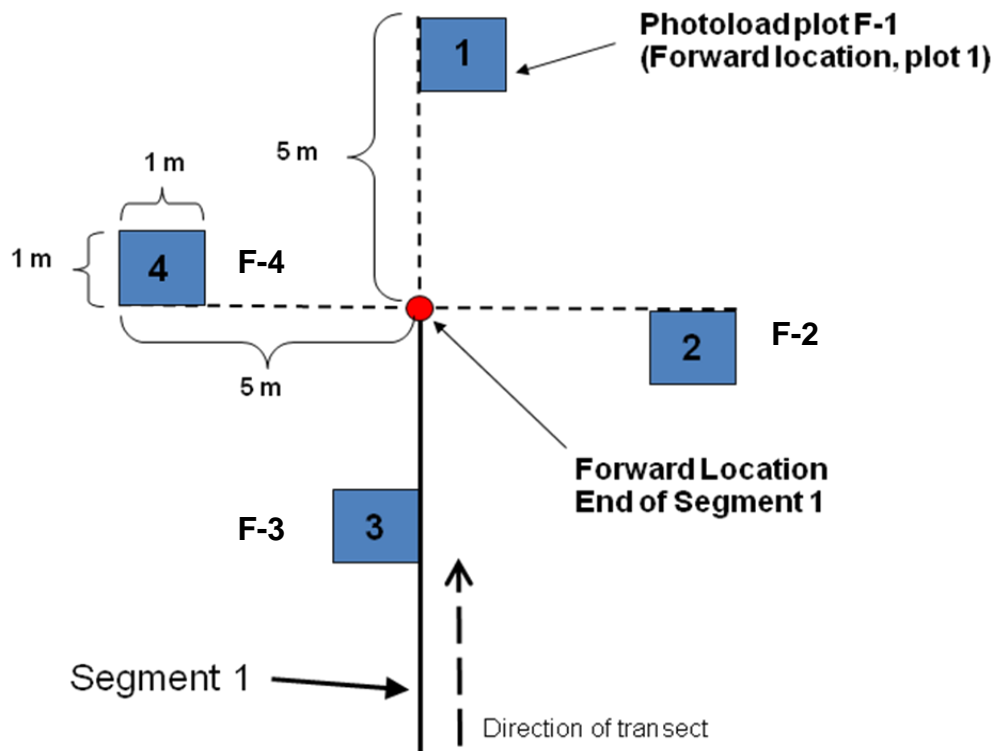


Figure 6. Arrangement of pinwheel photoload plots at end of segment 1 (Forward location).

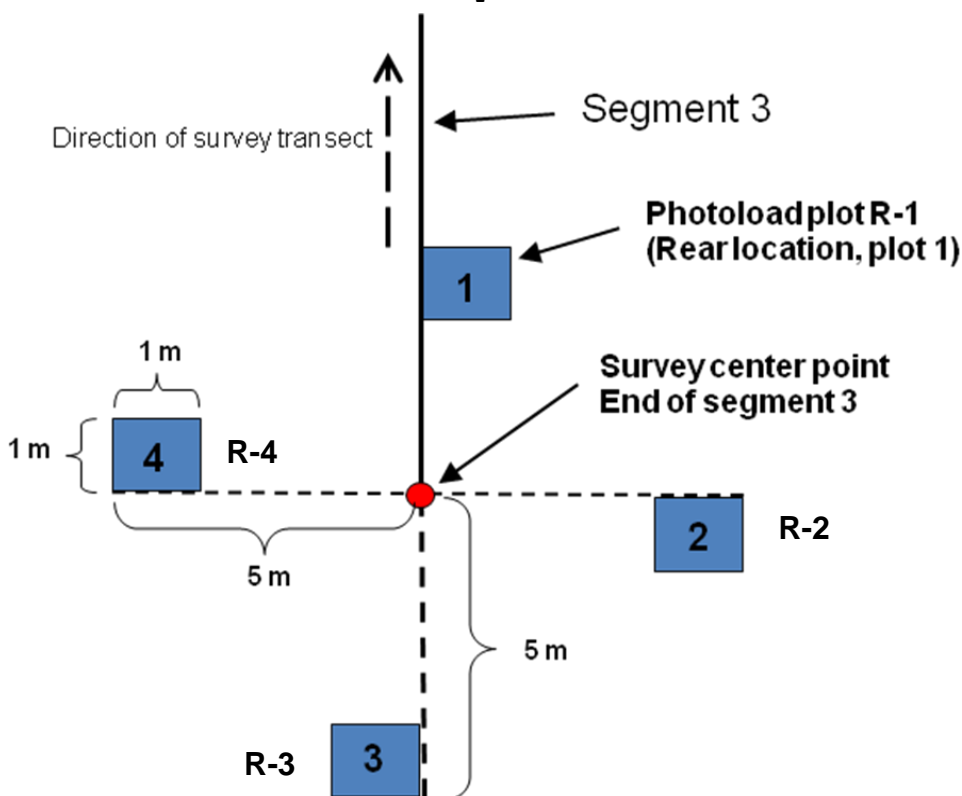


Figure 7. Arrangement of pinwheel photoload plots at end of segment 3 (Rear location).

## PHOTOLOAD SAMPLING OVERVIEW

Once the PVC sampling frame is situated, use the Photoload Sequence photos (laminated sheets) to estimate fuel loadings in the 1m<sup>2</sup> photoload plot. Record your measurements for each plot in the column that corresponds to the plot number for the sampled plot. Estimating fuel loading with the photoload technique involves matching the conditions observed on the ground within the sampling plot with the conditions in the set of photographs of loadings provided in the photoload sequences. The conditions are matched only on visual assessment of loading characteristics; no other factors such as fuelbed appearance, color, or wetness should be considered. If loading seems to fall between two of the photos on the sequence sheets, choose the appropriate loading between the two loading values and record it on your data sheet.

**HEADER INFORMATION:** Enter as per instructions for Trees data sheet. UTM data for plot location does not need to be re-entered.

**Record fuel loadings as per instructions below.**

## 1-100 HOUR FUELS

Use your go-no-go gauge to differentiate among fuels in each of the classes: 1-hour (< 0.25 inch diameter), 10-hour ( $\geq$  0.25 to 1 inch diameter), and 100-hour fuels ( $\geq$  1 to < 3 inches diameter). Iteratively compute photoloads for each fuel class using the photoload sequences. The photoload sampling technique was designed to estimate loadings for the fuel components that are above the litter layer and plainly visible and identifiable. Some parts of twigs and branches may be buried in the litter and duff. Do not include the buried material in the loading estimate. It is not necessary to measure the height of 1-100-hour fuels. The most important guidance for estimating loadings of fine woody components is to first correctly identify the right fuel components. Three questions must be answered for the observed fuels to be sampled — **are the fuels: 1) down 2) dead, and 3) woody?**

**a) DOWN** - the fine fuel particles must be unattached from their parent stems and be below the 2 meter surface fuel height to be considered down; down fuels are those fuel components that are not attached to live or upright

#### April 2015 Version

dead plants and are entirely on the ground or below 2 meters in height. All woody fuel originating from a tree bole is considered down woody if it leans at an angle less than 45 degrees from the horizontal ground. If it is at an angle greater than 45 degrees above horizontal, it can only be considered down if it is a broken bole or branch from a tree where at least one end of the bole is touching the ground (not supported by its own vegetation or other branches).

**b) DEAD** - fuels that have no live foliage or branchwood material. Fresh slash and newly broken branches with green foliage are still considered dead even though they are technically alive because we assume they will eventually be dead. Dormant does not mean dead. Dormant plants with no live foliage do not count as dead fuel. Examples include shrubs that have lost their leaves in the autumn and winter.

**c) WOODY** - Many people are confused by woody fuel identification and tend to put stalks of annual plants, for example, into the woody category when in fact the stalks are dead herbaceous. Remember needles, detached grass blades, pine cones, and pieces of bark on the ground are considered litter and are not included in the photoload estimates.

**1-hour fuels** are smaller or equal in diameter than 0.25 inches. Use go/no-go gauge to determine which fuels within the plot are 1-hour fuels. View plot from above and focus only on 1-hour fuels. Compare with the appropriate photoload sequence and find closest match. Record the fuel loading value (above photo;  $\text{kg/m}^2$ ) on the data form. If the fuel loading within the plot appears to be between photos, interpolate the fuel loading values associated with the photo above and below what you see in the plot. If there are no 1-hour fuels within the plot, record “9999”.

**10-hour fuels** are larger in diameter than 0.25 inches but equal to or smaller than 1 inch. As above, use the go/no-go gauge to determine which fuels in the plot are 10-hour fuels. Use the appropriate photoload sequence (for 10-hour fuels) and visually find the closest match. Record fuel loading value, or if necessary interpolated value ( $\text{kg/m}^2$ ). Record “9999” if there are no 10-hour fuels in the plot.

**100-hour fuels** are larger in diameter than 1 inch but equal to or smaller than 3 inches. Use same methodology as with 1-hour and 10-hour fuels. Record fuel loading ( $\text{kg/m}^2$ ) on data form. Enter “9999” if there are no 100-hour fuels in the plot.

**Record the appropriate  $\text{kg/m}^2$  value in the appropriate box on the data sheet for each plot (1-4).**

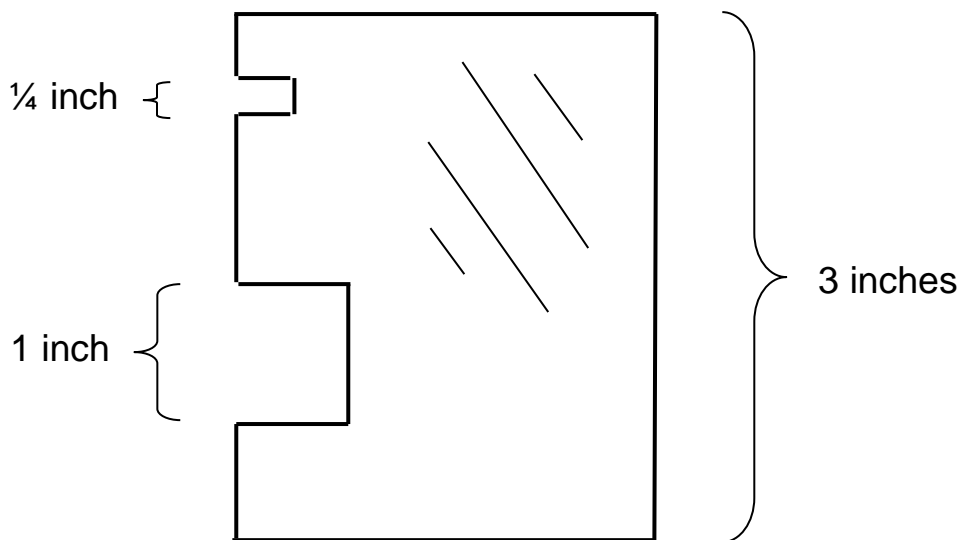


Figure 8. Example of a “go / no-go” gauge used to help identify 1, 10 or 100 hour fuels.

**Obscured fuels:** If fuels are obscured by shrubs or other vegetation as you're looking down on the plot, you should try to move the obscuring vegetation slightly to visualize the loading. The goal of the photoload sampling is to measure fuels that would interact with surface fire (as even obscured fuels would). This may be difficult in really shrubby plots and one should attempt to do their best to objectively visualize the fuels in the plot without undue effort or disturbance to other fuel/vegetation characteristics within the plot. Keep in mind that if the central axis of a piece of fuel is truly buried below ground surface, it is not included in the estimate. Also try not to disturb litter, thatch, or duff as those fuel components are measured later.

## SHRUBS AND HERBS

Shrubs are woody plants that branch below or near ground level into several main stems, and have no clear trunk. They may be deciduous or evergreen, and at the end of each growing season there is no die-back of the axes. Herbs (grasses and forbs) are small, nonwoody, seed-bearing plants in which aerial parts die back at the end of each growing season.

## SHRUB/HERB FUEL LOAD ESTIMATION ( $\text{Kg/m}^2$ )

The first step in estimating shrub and herb loadings with the photoload technique is to identify the plant species within the sample unit. The user must estimate loading by matching the group of species occurring in the sample area with one or more of the photoload sequences. If species in your study area are not represented in the photoload sequences it will be necessary to match the morphology of the species observed in the field with one of the seven shrub species, two grass species, and two forb species included in the photoload photo sequences. **See the table of common shrub species below to determine which photoload sequence should be used.** Select the correct loading photo within the sequence based on two additional characteristics: cover and density. If there are several species of vegetation on your plot, use the most appropriate photoload sequence for each species and combine (add) the fuel loading ( $\text{kg/m}^2$ ) from each to derive the overall shrub fuel loading for the plot. Measure all **live** shrub and herbaceous loadings within and overhanging the plot up to a 2 meter height above the plot.

For shrubs and herbs, the user should try to match the pictures with field conditions based on three characteristics: species (previously discussed), cover and density. Once a picture is chosen, then the corresponding loading must be adjusted for differences between height in the picture and height in the sample area. The average height of each plant photo series is indicated at the top of each page in the photoload sequences. Adjust shrub and herbaceous loading only when the average plant height in the photos is different from the average height of plants on your plot.

**\*\* Note:** Match grasses based on species, cover, and density regardless of whether vegetative material in the field is live or dead (only dead material is shown in the photoload sequences).

**Shrubs  $\text{Kg/m}^2$ :** Record shrub fuel loading on data form. Focus on **live** shrubs or partly living shrubs. Do not include fully dead shrubs in the fuel loading estimate.

**Herbs (grasses and forbs)  $\text{Kg/m}^2$ :** Record the fuel loading of herbs (grasses and forbs combined). Include both live and dead material in the herb fuel loading estimate.

## SHRUB AND HERB COVER ESTIMATION (% COVER)

Leave the photoload sampling frame in place and proceed to estimate the average height (use height from fuel loading above if appropriate) and % cover of live shrubs, by species, in the  $1\text{m}^2$  frame. Record height to the nearest cm and % cover to the nearest 1%. This is a visual estimate of cover. If it's not possible to determine shrub species, enter genus if known. If genus is not possible, enter "UNKN1". If another unknown genus is encountered in a later plot, enter "UNKN2", and so on. Herb cover does not need to be estimated by species. If there are no shrubs in the plot, record "9999" in the species column of the data form. If there are no herbs in the plot, record "9999" in the %Cover column of the data form.

**Note:** Assume a standard shrub height of 14 inches (35.6 cm) for the photos in the sagebrush (*Artemisia* spp.) photoload sequence. Adjust shrub your fuel loading estimates for these in the same manner as the remaining photoload sequences (e.g., Snowberry [*Symphoricarpos albus*]).

**Shrub species:** Use species codes in the table 2 at the end of the document. Note: Make sure to label UNKN shrub specimens with appropriate UNKN code (UNKN1, UNKN2, UNKN3, etc.)

**Percent cover:** percent cover estimate in 10% increments

**Avg. Height (cm):** Use a ruler or a tape measure to measure and record the average height (cm) of shrubs and herbs in the photoload plots.

### SEEDLING COVER ESTIMATION (% COVER)

Leaving the photoload sampling frame in place, estimate the % cover of seedlings, by species or UNKN (unknown), within the  $1\text{m}^2$  plot. Seedlings are trees  $\leq 1.4$  m tall.

**Tree seedling species:** Record species code from Table 1 at the end of the document. Note: Make sure to label UNKN tree specimens with appropriate UNKN code (UNKN1, UNKN2, UNKN3, etc.)

**% Cover:** Record % cover of each species separately for plots 1-4.

### FUEL DEPTH

Litter/Duff fuel depth is measured at points 4 and 5 meters from plot center (survey point) within each photoload plot, along the trailing edge of the plot frame as you sweep clockwise around the pinwheel (see Figure 9). There are a total of 8 sample locations in each pinwheel plot group.

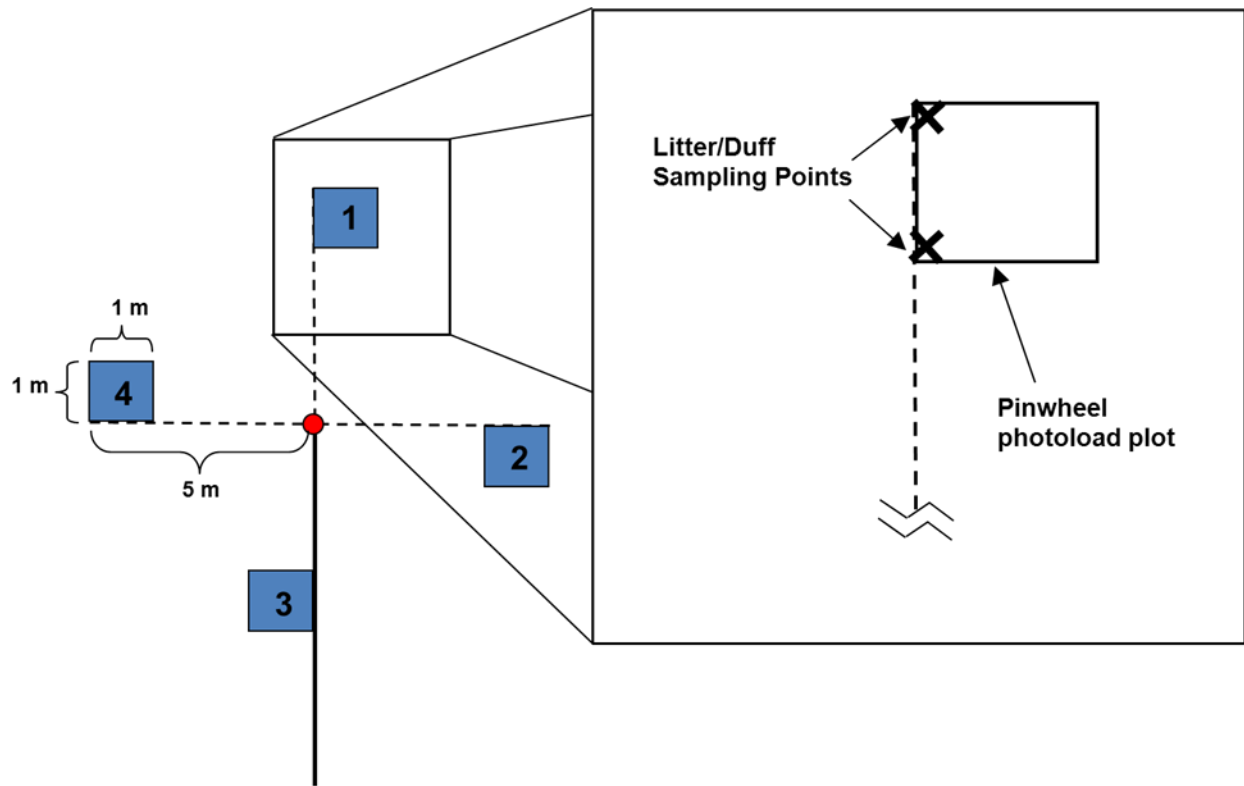
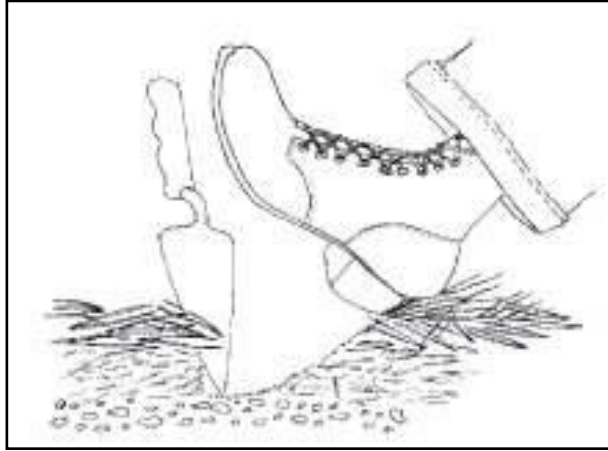


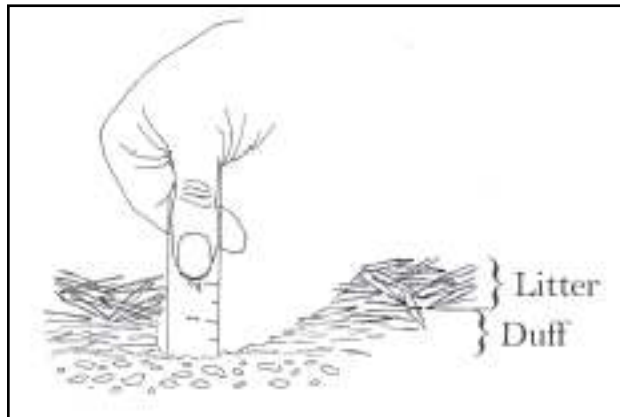
Figure 9. Location of 2 of the 8 litter/duff sampling points (at corners of photoload plot, 4 and 5 m from center point).



1) Use your boot or a small shovel to carefully pull the litter and duff layers away until you are down to mineral soil.

**Litter** is the surface layer of the forest floor that is not in an advanced stage of decomposition, usually consisting of freshly fallen leaves, needles, twigs, stems, bark, cones, and fruits.

**Duff** is the partially decomposed organic material of the forest floor beneath the litter.



2) Use a plastic ruler to estimate combined duff and litter depth from the surface of the mineral soil to the top of the litter layer, including any decomposing material that might be present.

**Record depth (cm) in the appropriate box for plots 1-4.** For trace amounts of duff or litter record “0.001”.

3) Examine the duff/litter profile and estimate the percent of the total depth that is made up of litter, to the nearest 10%.

**Record % liter in the appropriate box for plots 1-4.**

## **DATA FORM – SAPLING TALLY**

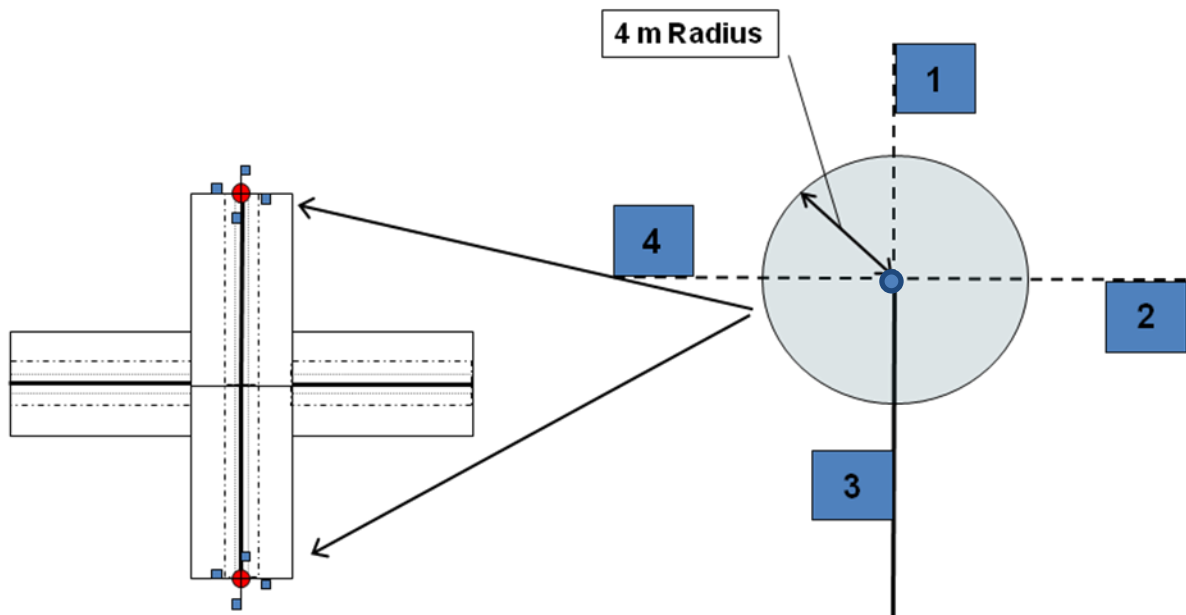
### **SAPLING TALLY BY SPECIES AND DIAMETER CLASS (4 m radius circular plot at pinwheel center; Figure 10)**

Within a 4 m radius circular plot, located at the center of each pinwheel (see Figure 10) tally the live saplings within the plot by species and diameter class. Saplings are trees with a dbh < 10cm and > 1.4m high. Saplings tallied in these plots may have disease or damage, they should still be tallied as long as they are standing, have green leaves, and meet the diameter/height criteria.

**Species:** See list of tree species used in live-tree sampling. Tally all the saplings of a species within each of the 2 diameter classes (below). **Each row of the form should correspond to one species-diameter class combination.**

**Diameter Class:** Saplings are tallied in 2 diameter classes; 0 to <5 cm, and 5 to <10 cm. Enter “2.5” in the Dia. Class column when tallying saplings in the 0-5 cm diameter class and “7.5” when tallying saplings in the 5-10 cm class.

**Average Height:** Enter the average height of a diameter class – species combination to the nearest 0.1 m.



**Figure 10.** Sapling plot (4 m radius circular plot) at each pinwheel location.

**Table 1. Tree species codes**

Code			Code		
	<b>Pines</b>			<b>Douglas-fir - Redwood</b>	
PIAL	Whitebark pine	<i>Pinus albicaulis</i>	PSME	Douglas-fir	<i>Pseudotsuga mensziesii</i>
PIAT	Knobcone pine	<i>Pinus attenuata</i>	SEGI	Giant Sequoia	<i>Sequoia</i>
PICO	Lodgepole pine	<i>Pinus contorta</i>	SESE2	Coast redwood	<i>Sequoiadendron sempervirens</i>
PIFL	Limber pine	<i>Pinus flexilis</i>			
PIJE	Jeffrey pine	<i>Pinus jeffreyi</i>		<b>Cedar - Larch</b>	
PILA	Sugar pine	<i>Pinus lambertiana</i>	CADE3	Incense-cedar	<i>Calocedrus decorum</i>
PIMO	Western white pine	<i>Pinus monticola</i>	CHLA	Port-Orford-cedar	<i>Chamaecyparis lawsoniana</i>
PIPO	Ponderosa pine	<i>Pinus ponderosa</i>	CHNO	Alaska-cedar	<i>Chamaecyparis nootkatensis</i>
			LALY	Subalpine larch	<i>Larix lyallii</i>
	<b>True firs</b>		LAOC	Western larch	<i>Larix occidentalis</i>
ABAM	Pacific silver fir	<i>Abies amabilis</i>	THPL	Western redcedar	<i>Thuja plicata</i>
ABCO	White fir	<i>Abies concolor</i>			
ABGR	Grand fir	<i>Abies grandifolia</i>		<b>Spruce - Hemlock</b>	
ABLA2	Subalpine fir	<i>Abies lasiocarpa</i>	PIBR	Brewer Spruce	<i>Picea brewerii</i>
ABMA	California red fir	<i>Abies magnifica</i>	PIEN	Engelmann spruce	<i>Picea engelmanni</i>
ABMAS	Shasta red fir	<i>Abies shastensis</i>	PISI	Sitka spruce	<i>Picea sitkensis</i>
ABPR	Noble fir	<i>Abies princeps</i>	TSHE	Western hemlock	<i>Tsuga heterophylla</i>
			TSME	Mountain hemlock	<i>Tsuga mertensiana</i>
				<b>Unknown Species*</b>	
JUOC	Western juniper	<i>Juniperus occidentalis</i>	TREEC	Unknown conifer	
TABR	Pacific yew	<i>Taxus brevifolia</i>	TREED	Unknown Hardwood	
			UNKN1	Unknown Species 1	
	<b>Hardwoods</b>		UNKN2	Unknown Species 2	
CELE3	Curly-leaf mountain mahogany	<i>Cercocarpus ledifolius</i>		* (Do not use for objects)	
POTR	Quaking aspen	<i>Populus tremuloides</i>			
POTRI	Black cottonwood	<i>Populus trichocarpa</i>			

Table 2. Shrub Species Codes

Code	Common Name	Scientific Name	Photoload Reference spp.
ACCI	Vine maple	<i>Acer circinatum</i>	<i>Amelanchier alnifolia</i>
ACGL	Rocky Mountain maple	<i>Acer glabrum</i>	<i>Amelanchier alnifolia</i>
AMAL	serviceberry	<i>Amelanchier alnifolia</i>	<i>Amelanchier alnifolia</i>
ARTRV	Big sagebrush	<i>Artemisia tridentata</i>	<i>Artemisia</i> spp.(Sagebrush photoload)
ARUV	bearberry; kinnikinnick	<i>Arctostaphylos uva-ursi</i>	<i>Vaccinium scoparium</i>
ARNE	Pinemat manzanita	<i>Arctostaphylos nevadensis</i>	<i>Amelanchier alnifolia</i>
ARPA	Green leaf manzanita	<i>Arctostaphylos patula</i>	<i>Amelanchier alnifolia</i>
BEAQ	Oregon grape	<i>Berberis aquifolium</i>	<i>Berberis repens</i>
BENE	Cascade Oregon grape	<i>Berberis nervosa</i>	<i>Berberis repens</i>
BERE	Creeping Oregon grape	<i>Berberis repens</i>	<i>Berberis repens</i>
CACH	Golden chinquapin	<i>Castanopsis chrysophylla</i>	<i>Amelanchier alnifolia</i>
CEVE	snowbrush ceanothus	<i>Ceanothus velutinus</i>	<i>Amelanchier alnifolia</i>
CHISP	Prince's pine	<i>Chimaphila</i> sp.	<i>Vaccinium scoparium</i>
CHRSP	rabbitbrush	<i>Chrysothamnus</i> sp.	<i>Artemisia</i> spp.(Sagebrush photoload)
HODI	ocean-spray	<i>Holodiscus discolor</i>	<i>Amelanchier alnifolia</i>
LOSP	honeysuckle	<i>Lonicera</i> sp.	<i>Symphoricarpos albus</i>
PHLE	mockorange, syringa	<i>Philadelphus lewisii</i>	<i>Amelanchier alnifolia</i>
PHMA	ninebark	<i>Physocarpus malvaceus</i>	<i>Symphoricarpos albus</i>
PREM	bittercherry	<i>Prunus emarginata</i>	<i>Symphoricarpos albus</i>
PUTR	bitterbrush	<i>Purshia tridentata</i>	<i>Artemisia</i> spp.(Sagebrush photoload)
RISP	currant	<i>Ribes</i> sp.	<i>Symphoricarpos albus</i>
RIAU	golden currant	<i>Ribes aureum</i>	<i>Symphoricarpos albus</i>
RICE	wax current	<i>Ribes cereum</i>	<i>Symphoricarpos albus</i>
RHAL	Cascade azalea	<i>Rhododendron albiflorum</i>	<i>Amelanchier alnifolia</i>
ROSP	Rose	<i>Rosa</i> sp.	<i>Symphoricarpos albus</i>
RUSP	Bramble, blackberry	<i>Rubus</i> sp.	<i>Amelanchier alnifolia</i>
SASP	willow	<i>Salix</i> sp.	<i>Amelanchier alnifolia</i>
SACE	Blue elderberry	<i>Sambucus cerulea</i>	<i>Amelanchier alnifolia</i>
SARA	red elderberry	<i>Sambucus racemosa</i>	<i>Amelanchier alnifolia</i>
SPBE	Birchleaf spiraea	<i>Spiraea betulifolia</i>	<i>Amelanchier alnifolia</i>
SPSP	Spirea	<i>Spirea</i> sp.	<i>Symphoricarpos albus</i>
SYSP	snowberry	<i>Symphoricarpos</i> sp.	<i>Symphoricarpos albus</i>
SYAL	Common snowberry	<i>Symphoricarpos albus</i>	<i>Symphoricarpos albus</i>
SYOR	Mountain snowberry	<i>Symphoricarpos oreophilus</i>	<i>Symphoricarpos albus</i>
VASP	huckleberry	<i>Vaccinium</i> sp.	<i>Vaccinium globulare</i> or <i>scoparium</i>
VASC	grouse Huckleberry	<i>Vaccinium scoparium</i>	<i>Vaccinium scoparium</i>
XETE	beargrass	<i>Xerophyllum tenax</i>	<i>Xerophyllum tenax</i>
UNKN1	Unknown species 1	Collect specimen for later identification	
UNKN2	Unknown species 2	Collect specimen for later identification	